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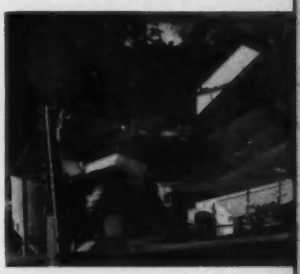
COMING NEXT MONTH

Cement Mason's Manual—Part III. The January installment of this important series gets down to some of the specific problems encountered in construction concrete flatwork. Preparation of the site, placing the concrete, finishing surfaces and curing, are all dealt with in some detail. Single copies of the complete Cement Mason's Manual may be obtained without charge by writing directly to the Portland Cement Association, 22 West Grand Avenue, Chicago, Illinois.



Lightweight Concrete. Next month, in the first of a series of articles on lightweight concrete, we will review some of the history and background of this branch of modern concrete construction technology as a means of indicating why the subject is so important today.

House of Reinforced Concrete. Home builders have tried again and again to win wide acceptance for reinforced concrete in above-grade home construction. This article will tell about the promising work being done along this line by a Florida builder.

Over 36,500 copies mailed. Edited for all who are concerned with quality, job placed concrete (including prestress, tilt-up, lift slab, and thin-shell)—its specification, production, handling, forming, reinforcing, placing, finishing and curing: *Concrete Contractors, General Contractors, Engineers, Architects, Industrial Construction and Maintenance Men, Highway Engineers, Ready-Mix and Prestressed Concrete Producers.*

About our page numbers: The pages of Concrete Construction Magazine are numbered continuously from January through December each year as a means of facilitating the use of bound volumes for reference purposes.

tools for horizontal surfaces

There are many tools for finishing concrete surfaces, but this manual will deal only with those tools that are used to finish horizontal concrete surfaces. In most cases, the apprentice cement mason will receive his initial on-the-job training primarily with flatwork finishing tools.

Straightedge

A straightedge (Fig. 12) or strike-off rod is usually a straight piece of 2x4 or a 1x4 with a 1/2x2-in. shoe strip attached to the bottom (Fig. 13). It can, however, be made of any straight piece of wood or metal that has sufficient rigidity. It is preferable to use a tool that has been specifically made as a straightedge instead of just a piece of lumber. The striking surface of a straightedge should always be straight and true. The straightedge should be longer than the widest distance between the screeds or edge forms. It is the first finishing tool used by the cement mason after the concrete is placed and is used to strike off or screed the concrete surface to proper grade.

FIG. 12. Straightedge or strike-off rod.

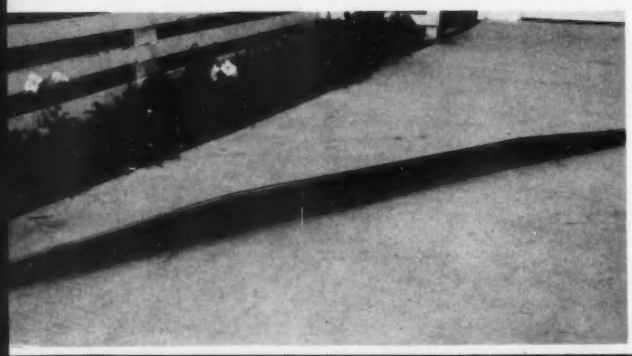
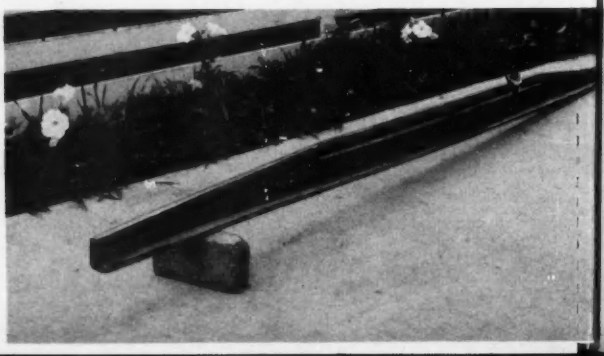


FIG. 13. The recommended straightedge.



Hand Tamper

After the concrete has been struck off, hand tampers (Fig. 14) can be used to compact the concrete into a dense mass. They are used on flatwork construction with low-slump concrete. Such concrete is usually quite stiff and is often difficult to work.

One common form of hand tamper is better known in the trade as a "jitterbug." Its base is usually made of a metal grill 6½ in. wide by 36 in. or 48 in. long. Tampers are used to force the large particles of coarse aggregate *slightly* below the surface in order to enable the cement mason to put the desired finish on the concrete surface. This tool should be used only with concrete having a very low slump—about 1 in.—and should be used to bring just enough mortar to the surface for proper finishing. The jitterbug or tamper should be used sparingly and in most cases is not recommended and not necessary, and the cement mason can proceed directly to darbying, the next step in quality finishing.

FIG. 14. Hand tamper, commonly called a jitterbug.

Darby

A darby (Fig. 15) is a long, flat, rectangular piece of wood, aluminum or magnesium from 30 to 80 in. long and from 3 to 4 in. wide with a handle on top. It is used to float the surface of the concrete slab immediately after it has been screeded, to prepare it for the next step in finishing. This tool should be used to eliminate any high or low spots or ridges left by the straightedge. It should also sufficiently embed the coarse aggregate for subsequent floating and troweling.

FIG. 15. Darby.

Bull Float

A bull float (Fig. 16) is a large, flat, rectangular piece of wood, aluminum or magnesium, usually 8 in. wide and 42 to 60 in. long with a handle 4 to 16 ft. in length. The function of the bull float is essentially the same as that of the darby but it enables the cement mason to float a larger section of a wide slab. The bull float is more commonly used outdoors or where there is enough room to use the long handle.

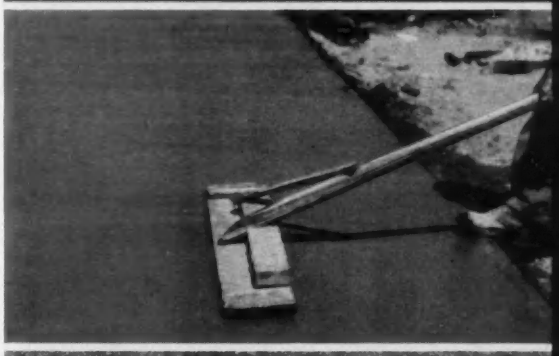


FIG. 16. Bull float.

Edger

Edgers (Fig. 17) come in many sizes; all are about 6 in. long, and vary in widths from 1½ in. to 4 in., with lips from 1/8 in. to 5/8 in., and having radii from 1/8 in. to 1½ in. The curved-end edger is considered one of the more popular types. Edgers are used to produce a radius at the edge of a slab. This improves the appearance and reduces the risk of damage to the edge.

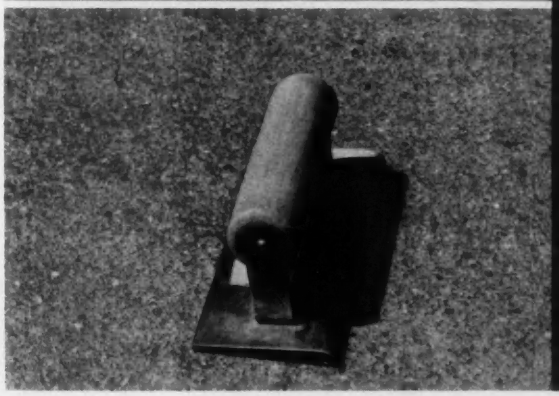


FIG. 17. Edger.

FIG. 18. Jointer or groover.

FIG. 19. Power joint cutter.

FIG. 20. Hand float.

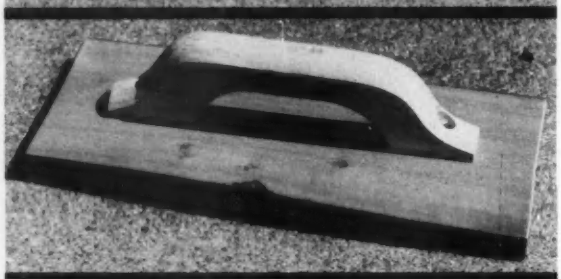


FIG. 21. Wood float.

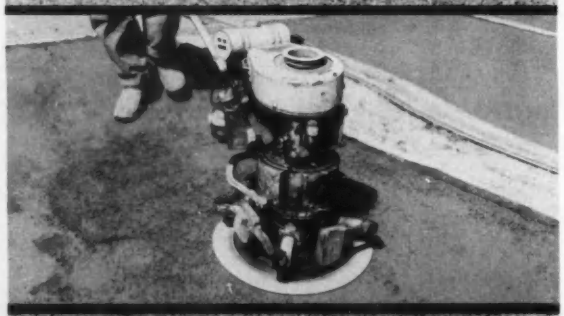


FIG. 22. Power float.

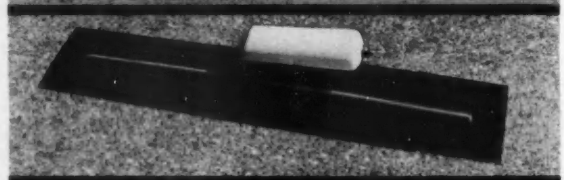


FIG. 23. Steel trowel.

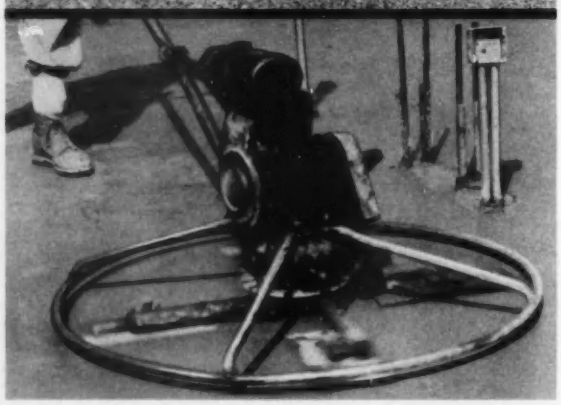


FIG. 24. Power trowel.

Jointer or Groover

Jointers (Fig. 18), sometimes called groovers, are about 6 in. long and vary from 2 to 4½ in. wide, and have shallow, medium or deep bits (cutting edges) running from 3/16 in. to 3/4 in. in depth. A jointer is used to cut a joint partly through fresh concrete. These joints, sometimes referred to as contraction or control joints, are used to predetermine the location of any possible cracks.

Power Joint Cutter

Another method of cutting joints in concrete slabs is with an electric or gasoline-driven saw (Fig. 19) fitted with a shatterproof abrasive or diamond blade. A power cutter produces a narrow joint that minimizes the possibilities of spalling at the joint due to traffic. The joint is cut in the concrete surface 4 to 12 hours after the concrete has hardened or as soon as the concrete surface will not be torn or damaged by the saw.

Hand and Power Floats

Hand floats are made of aluminum, magnesium or wood. Aluminum or magnesium floats (Fig. 20) are usually made in two sizes, 12 or 16 in. long by 3½ in. wide. Wood floats (Fig. 21) are 12, 15 or 18 in. long and 3½ or 4½ in. wide.

The hand float is used to prepare the concrete surface for troweling. Hand floats are also used for floating the concrete around pipes and columns and against walls which power floats cannot reach.

Power floats are driven by electricity or by gasoline engines. A power float has a rotating disk about 2 ft. in diameter (Fig. 22). Usually in residential construction a power trowel (Fig. 24) is used with the trowel blades modified for floating. These floating machines perform the same operations as hand floating, but cover larger areas in a shorter length of time.

After the concrete is stiff enough to support the weight of a man, the power float can be used to compact the concrete.

Hand and Power Trowels

The cement mason's steel hand trowel comes in many different sizes ranging from 10 to 20 in. long and 3 to 4¾ in. wide (Fig. 23).

Each size trowel has its own use. For the first troweling of concrete flatwork a wide trowel 16 to 20 in. long is generally used. For troweling the slab the last few times, most cement masons prefer a "fanning" trowel 14 to 16 in. long and 3 to 4 in. wide.

A power trowel has three or four rotating steel trowel blades (Fig. 24). They are powered by electricity or by gasoline engine.

The purpose of steel troweling is to give the surface a dense, smooth finish.

fundamentals of the use of transit and level

ESTABLISHING ELEVATIONS WITH A BUILDER'S LEVEL

Set up the instrument where locations for which elevations are to be determined may be seen through the telescope. Level up the instrument and take a reading on the measuring rod by means of the horizontal cross hair in the telescope. The rod is then moved to the second point to be established. Then the rod is raised or lowered until the reading is the same as the original. The bottom of the rod is then at the same elevation as the original point.

MEASURING DIFFERENCE IN ELEVATION

To obtain the difference in elevation between two points, such as *A* and *B* in Fig. 25, set up and level the instrument at an intermediate point *C*. With the measuring rod held on point *A* note the reading where the horizontal cross hair in the telescope crosses the graduation marks on the rod. Then with the rod held on point *B*, sight on the rod and note where the horizontal cross hair cuts the graduations on the rod. The difference between the reading at *A* (5 ft.) and the reading at *B* (5½ ft.) is the difference in elevation between *A* and *B*. Thus point *B* is 1/2 ft. lower than point *A*.

When, for any reason such as irregularity of the ground or a large difference in elevation, the two points whose difference in elevation is to be determined cannot be sighted from a single point, intermediate points must be used for setting up the instrument, as shown in Fig. 26.

ESTABLISHING POINTS ON A LINE WITH A TRANSIT

Level the instrument and center it accurately over a point on the line by means of a plumb bob. Then sight the telescope on the most distant visible known point of that line. Lock the horizontal motion clamp screw to keep the telescope on line, and place the vertical cross hair exactly on the distant point with the tangent screw. Then, by rotating the telescope in the vertical plane, the exact location of any number of stakes on that same line may be determined (Fig. 27).

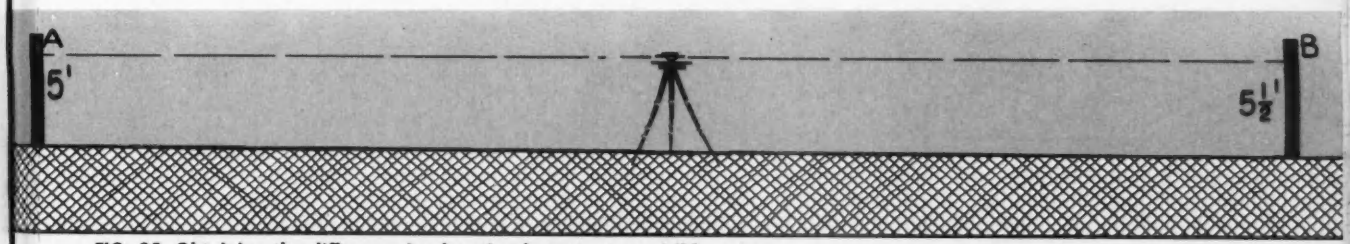


FIG. 25. Obtaining the difference in elevation between two visible points.

FIG. 26. Obtaining the difference in elevation between two points not visible to each other.

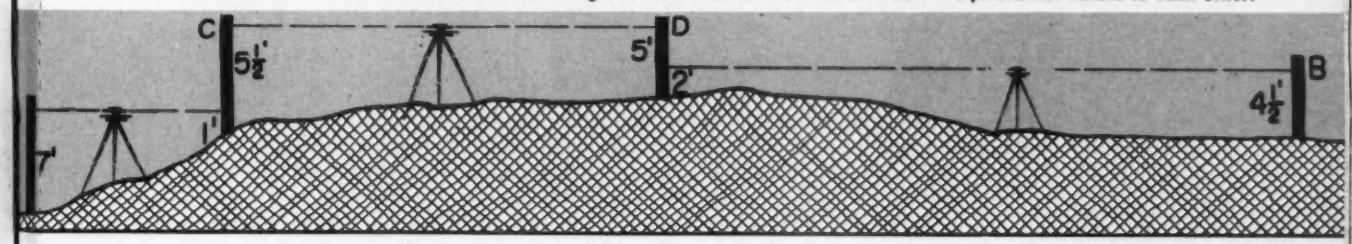
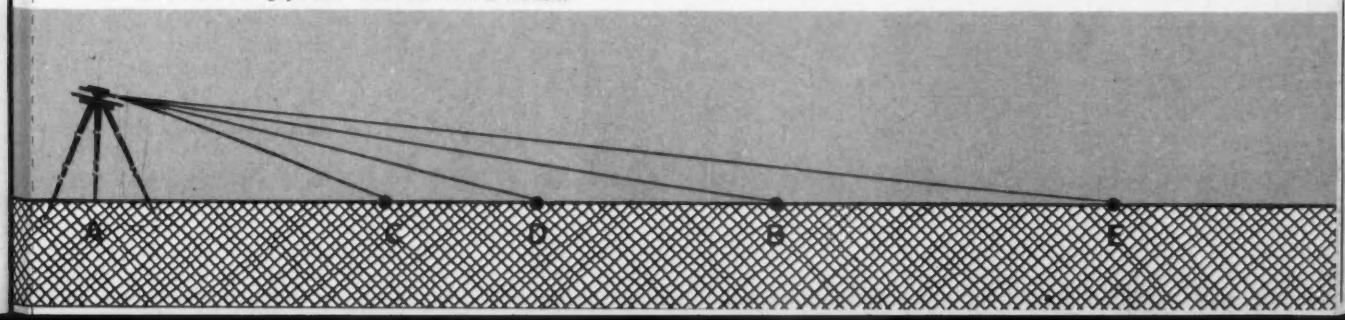
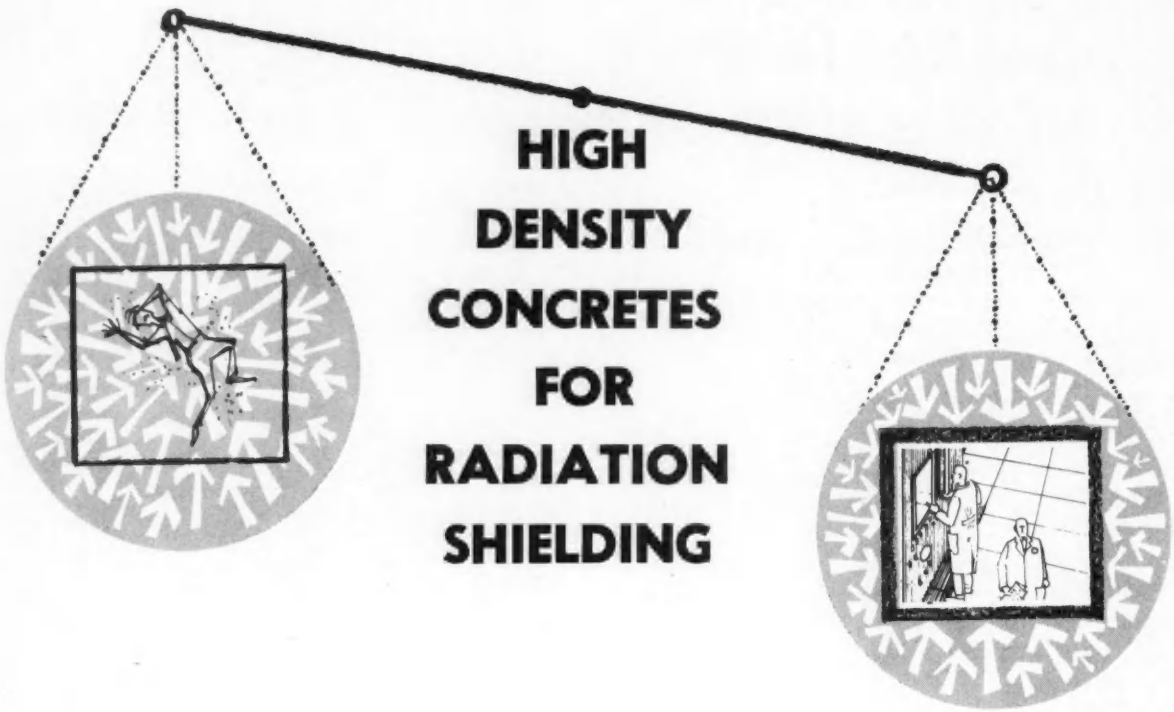


FIG. 27. Establishing points on a line with a transit.





HIGH DENSITY CONCRETES FOR RADIATION SHIELDING

No longer a novelty, high-density concretes are becoming an essential part of today's concrete industry. Using dense mineral aggregates, these concretes may weigh as much as 425 pounds per cubic foot and cost from $200 to $1,000 per cubic yard in place.

AN OUTGROWTH of the development of nuclear energy, high-density concrete is gaining widespread use as a shielding material to provide protection against radiation hazards. Peacetime applications of nuclear power in the form of medical and research reactors as well as power generators will almost surely increase the market for this relatively new form of concrete.

Since the effectiveness of any shielding material is dependent upon its mass, almost any material can be used if it is sufficiently thick. Concrete has obvious advantages over other products in this field because it provides excellent shielding qualities in reasonable thicknesses at an exceptionally low cost per pound. At the same time it meets all normal structural requirements.

For these reasons, concretes of many types have been used extensively in making structures for the protection of personnel and equipment from nuclear particles and rays. These concretes range from ordinary portland cement concrete to high-density or heavy concretes made of dense metallic aggregates and special cements. Where space requirements are not a critical factor, ordinary concrete will generally produce the most economical shield (see Concrete Construction, August, 1959). When space is at a premium, however, as is usually the case when a nuclear reactor is being installed in an existing building, the use of high-density concrete is often a practical necessity. In one installation, for example, the difference in thickness requirements between ordinary concrete and high-density concrete amounted to 6 feet per wall, or 12 feet in each direction. In this instance the use of heavy concrete cut the cubic content of the shielding structure in half.

In addition to this space-saving feature, high-density concrete may in many cases reduce

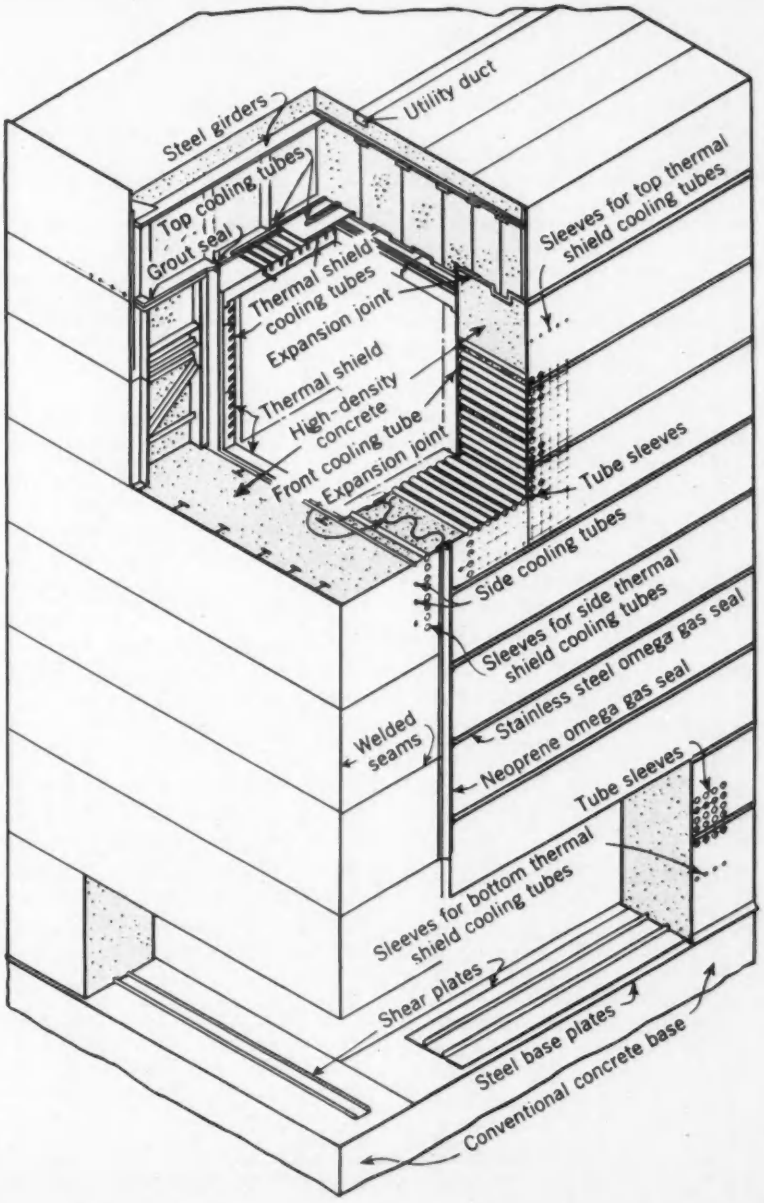
over-all costs considerably. Even on a relatively small job where the use of ordinary concrete would have required a wall thickness of 10 feet, it was determined that high-density concrete would accomplish the same shielding efficiency with a wall only 7.7 feet thick. In this case the cost estimates for a 10- by 100-foot shield came to $90,000 for ordinary concrete and only $74,000 for heavy concrete. With the added savings in floor space charges, the total savings amounted to nearly $20,000. On some major installations, heavy concrete has resulted in truly remarkable economies. This, of course, is dependent to a large degree on availability and cost of aggregates in the particular location under study.

In contrast with conventional concrete weighing around 150 pounds per cubic foot, high-density concretes normally weigh from 200 to 250 pounds per cubic foot. Among the natural aggregates most commonly used are barite, magnetite, limonite, geothite, and ilmenite. These can be used for the lower and medium weight ranges. For densities over 250 pounds per cubic foot, expensive aggregates such as ferrophosphorus and iron punchings can be combined with magnetite or ilmenite. For highly specialized applications, densities as high as 425 pounds per cubic foot can be obtained using steel punchings and iron shot as the primary aggregate.

Selection of high-density aggregates is determined by physical properties, availability, and cost. Usually it is desirable to use the heaviest aggregate available locally. Barite, for example, was used extensively during the early years of shielding at Oak Ridge National Laboratory, Tennessee, because of its availability from nearby mines. On subsequent Atomic Energy Commission projects in other localities, however, it was found more economical to use magnetite. During the past few years, ilmenite ore has been used on many jobs, particularly in Canada.

Generally, high-density concretes made with natural heavyweight aggregates can be designed to meet specific job requirements using conventional proportioning procedures. Strength demands are usually easy to meet due to the thick sections required for shielding. When especially hard aggregates such as magnetite iron ore are used, concrete strength increases beyond that of normal concrete. Workability of these dense mixes, however, is generally much poorer than that of conventional concretes.

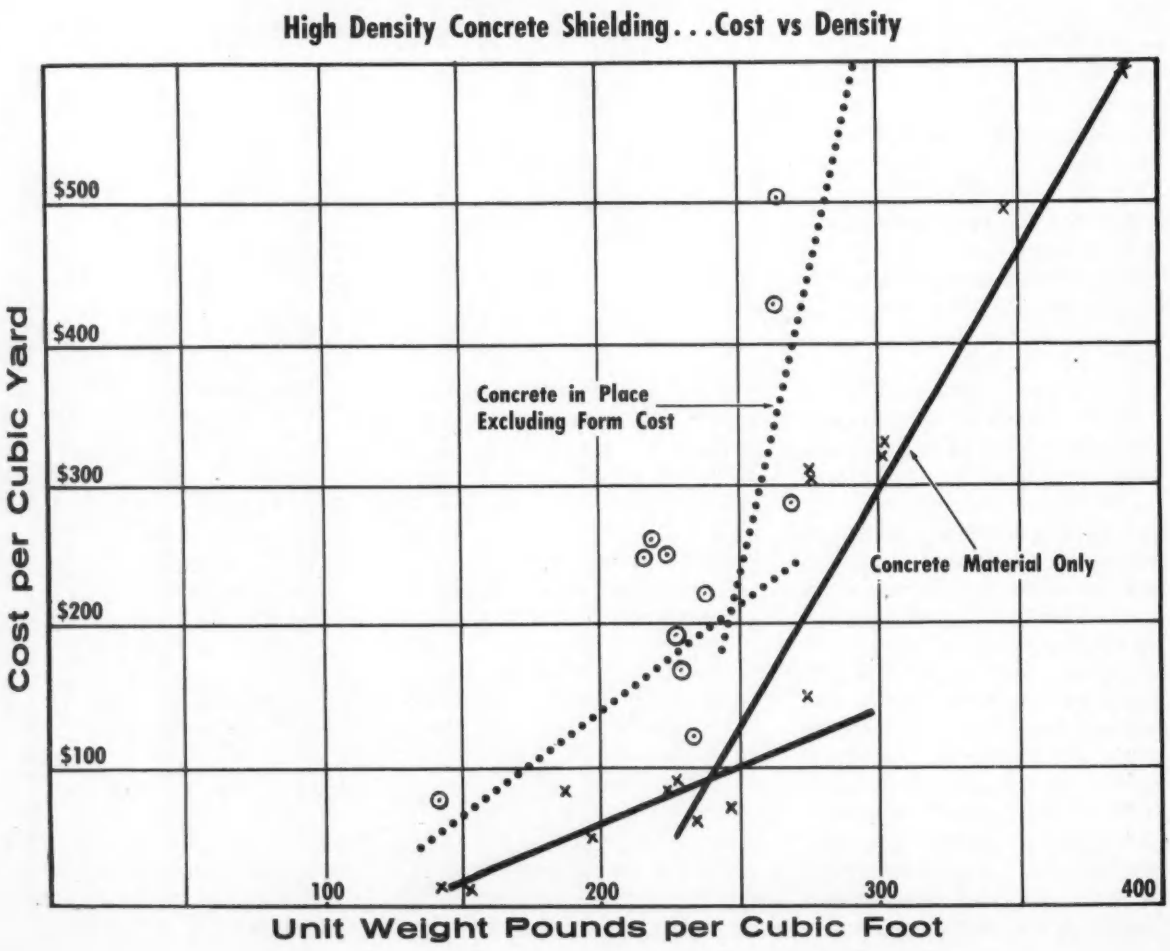
Drawing of reactor shield at Hanford Works near Richland, Washington, shows arrangement of side and top shields in which high-density Prepakt concrete was placed. Note the number of tube openings which add to the difficulties of preventing radiation leakage.



On the other hand, when heavy slags and smelter by-products are used, it is always advisable to determine in advance whether they will produce sound concrete. Some of these materials may soften or disintegrate in a concrete mix. Ferrophosphorus, particularly, should be used with care. On some jobs this aggregate has kept the concrete green or weak for several weeks. In addition to this peculiarity, on one Canadian project this mineral liberated a gas within the freshly placed concrete which then proceeded to catch fire. The cement was subsequently changed to a low-alkali type and there were no further difficulties.

In addition to high-density aggregates, additives containing boron are sometimes used to improve shielding properties. These usually consist of colemanite (the ore from which borax is made), boron frits, or borocalcite. Before utilizing any of these boron compounds, it is essential to make trial mixes under field conditions to be sure that strength and setting time are not adversely affected. Certain impurities often associated with boron compounds will completely inhibit the setting of concrete. Some authorities recommend that when colemanite is used, the other aggregates, cement, and water be mixed thoroughly before adding the colemanite in order to assure that the mix will harden. On at least one major construction project, however, it was reported that colemanite with fines removed (below 30-mesh) was used successfully with no special handling. Other boron compounds such as borocalcite and boron frits appear to be less erratic in their performance, but they are usually considerably more expensive than colemanite.

Developed by personnel of Brookhaven National Laboratory, this graph shows vividly the rapid cost increase which takes place after high density concrete shieldings exceed a unit weight of about 240 pounds per cubic foot.



Conventional mixing and placing methods can often be utilized for high-density concretes so long as the mix doesn't contain extremely heavy aggregates such as steel punchings and providing the forms don't contain a maze of embedded pipes, reinforcing bars, and access ports. Special equipment is not required although care has to be taken to prevent overloading the mixer and segregation of aggregates.

When exceptionally heavy aggregates are used, the Prepakt method offers several advantages. In this method, coarse aggregates are first placed in the forms and the interstices are filled later with a special grout. Segregation is minimized and concrete of uniform density and composition can be placed in restricted areas and around embedded objects. Also, the Prepakt method consistently gives greater density and homogeneity than other methods.

Another method used to place heavy concrete is pumping. If allowance is made for the increased density, conventional mixing and pumping equipment can be used. This method is not recommended, however, for concrete containing steel aggregates since these usually segregate out from the mix and lodge in the pump or other equipment. Heavy grouts composed of fine ferrophosphorus, steel shot and fine sands of barite, magnetite, or limonite can be pumped successfully.

Puddling is still another method sometimes used for placing high-density concrete. This consists of pouring several inches of mortar into the forms and then covering the mortar with a layer of aggregate. This coarse aggregate is then puddled into place by rodding or internal vibration.

High-density concrete can also be handled quite successfully by ready mixed concrete trucks, providing some allowance is made for the unusually dense mix. On a recent project at the Brookhaven National Laboratory, ilmenite concrete weighing 246 pounds per cubic foot was mixed in 7½-cubic-yard truck mixers. It was found desirable, however, to load these with no more than 2½ cubic yards per batch. Even then, the mixers suffered excessive blade wear, requiring replacement of one entire set of blades for every 250 cubic yards of concrete. And during this same job, which involved 4,350 cubic yards of high-density concrete, 14 auxiliary transmissions had to be replaced. During the early stages of this construction it was found that a minimum water content was not satisfactory since it resulted in inadequate mixing and non-uniform discharging. Admixtures were tried in an attempt to improve workability, but these were eventually eliminated and both the water and cement content increased.

In addition to cast-in-place uses, high-density concrete is often prefabricated into blocks of various shapes and sizes. These may range from ordinary masonry units up to huge blocks weighing 20 tons or more. The latter are used for special applications where removable shielding is required. These may require very close dimensional tolerances, necessitating elaborate steel forms, jigs, and fixtures. END

Almost 1500 high density blocks, weighing up to 33 tons each, were produced in this casting yard for the Target Building of the Brookhaven Alternating Gradient SYNCHROTRON. The cost for a concrete shield having a density of about 240 pounds per cubic foot ran $.027 per pound on this project.

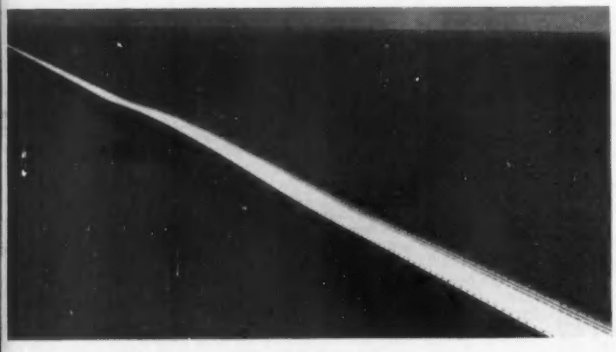
Readers who would like additional information on high density concrete for radiation shielding are invited to write on their business letterheads to Concrete Construction Publication, Inc., P. O. Box 444, Elmhurst, Illinois.

concrete construction size records

In August (page 226) we published two pages of pictures showing what we believed to be the first United States concrete construction projects to be carried out in certain categories. We thought we'd have some arguments on our hands, but either our information was pretty accurate or everybody was too busy arguing about the election to get involved in a discussion of concrete "firsts."

This month we're really crowding our luck with a similar project carried out on a world-wide basis, and dealing with size records rather than priorities. It is our hope, since the information presented here is necessarily limited, that this report will be just the first of a number of pictorial presentations designed to record some of the significant history of concrete construction. Readers are again invited to take pot shots at our information and to provide any rebuttal information they would like to see published on the subject.

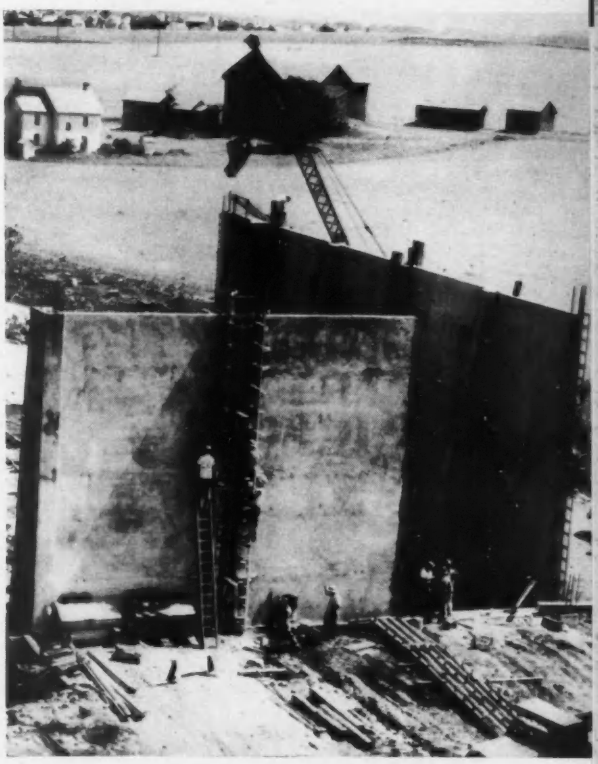
HIGHEST U. S. CONCRETE BUILDING: Executive House apartment building, Chicago, Illinois, now holds this title. It rises 371 feet for its 39 stories and uses 5,000 psi concrete through the seventeenth floor and 3,000 psi concrete above that. Its hold on this title is to be short lived, however, because construction has commenced on another apartment project in Chicago which will set a new height record. Marina City will include two circular 60-story buildings which are to rise 555 feet, making them the highest concrete buildings in the world.



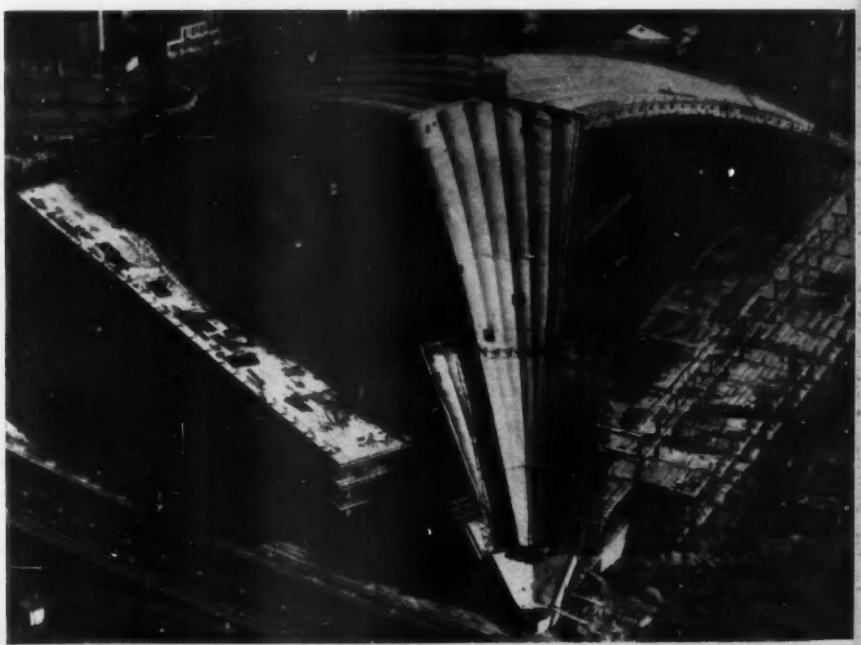
WORLD'S LONGEST BRIDGE: Lake Pontchartrain Causeway earns this title by right of its 24-mile length. It carries the Greater New Orleans Expressway on 180-ton prestressed deck units 33 feet wide and 56 feet long. Hollow 54-inch diameter prestressed piles support the big deck units.

FILE: History

LONGEST CONCRETE BRIDGE SPAN: Spanning 632 feet by means of hollow ribs, a concrete arch bridge in Stockholm, Sweden, still holds this record. It was designed by the world famed Eugene Freyssinet, who later became known as the father of prestressing. This is a record soon to topple, however. Now under construction in the harbor of Sydney, Australia, is the Paramatta River Bridge which will have a central arch 1,000 feet long. The bridge will be 2,000 feet long overall and is to be of hollow box-section concrete arch construction with prestressed columns and deck. Its 72-foot wide roadway will provide six vehicular lanes and two pedestrian paths.

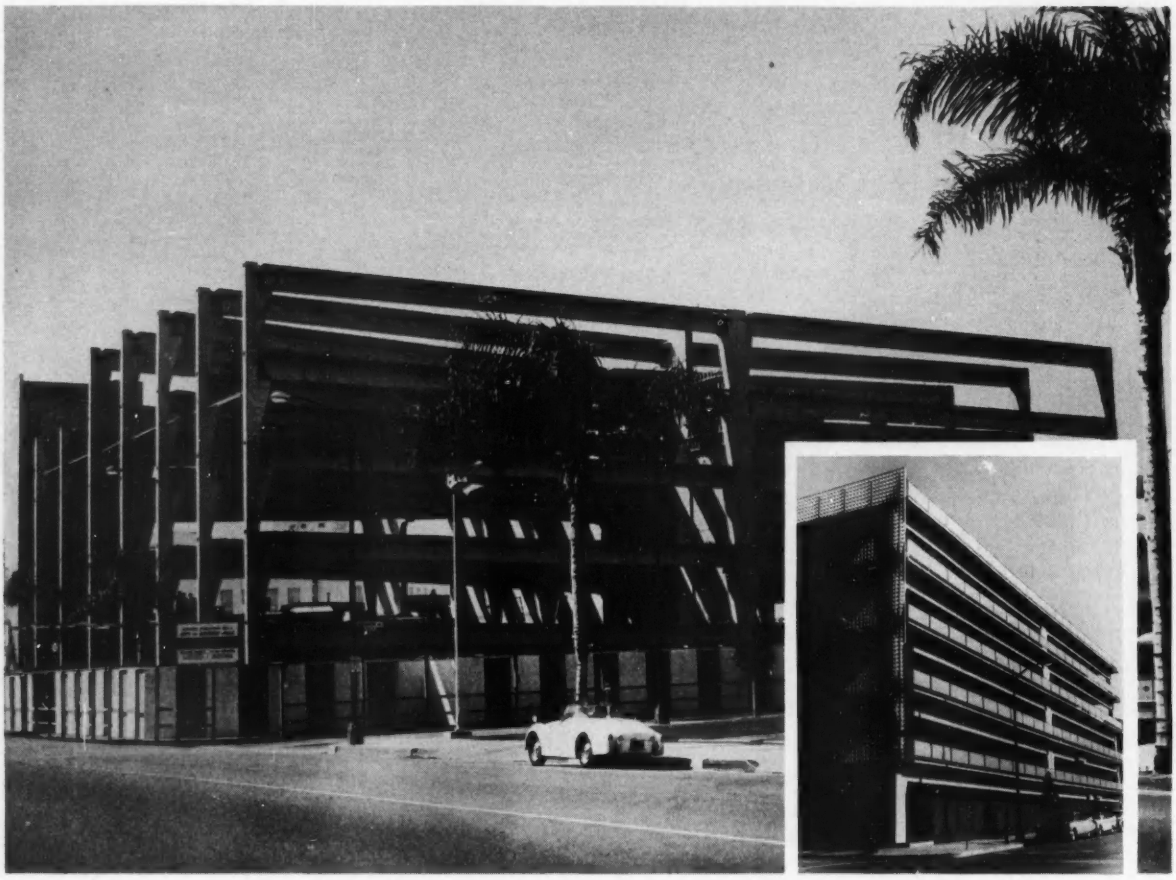


LARGEST TILT-UP PANELS: This record goes to the tilt-up panels for a storage building of the Hercules Cement Company, Stockertown, Pennslyvania. The panels are 30 feet 2 inches high by 19 feet 11 inches wide and vary in thickness from 8 inches at the top to 16 inches at the base. Imagine the lifting stresses encountered with these giants!



LARGEST ROOF IN THE WORLD: Centre National des Industries et des Techniques, Paris, France, by right of its twin shell roof spanning 721 feet along each of its three sides, earns this title. Its two superimposed 3.1-inch thick shells cover 5½ acres.

Owner: City of Beverly Hills, Cal.; **Architect:** Welton Becket & Associates, Los Angeles, Cal.; **Consulting Engineers:** T. Y. Lin & Associates, Van Nuys, Cal.; **General Contractors:** C. L. Peck, Los Angeles, Cal.; Ellis E. White Co., Los Angeles, Cal.; **Precast Columns & T's:** Wailes Precast Concrete Corp., Sun Valley, Cal.



The five-story Beverly Hills Garage illustrated above, providing parking space for 400 cars, is a unique precast, prestressed structure. Long spans of 75 feet eliminated columns in parking areas and use of lightweight aggregate minimized both horizontal and vertical loading.

PLASTIMENT Increases workability of lightweight concrete

Use of Plastiment Retarding Densifier increased the workability of the Ridgelite lightweight concrete thereby assuring a smooth, clean appearance to the exposed concrete members. Using high early cement, strengths averaged over 3,500 psi in 16 hours in the precast elements. Slab concrete placed at the site reached 3,500 psi in 2 days. 28-day strengths averaged 6,500 psi.

Mix contained 7-1/2 bags of cement per cubic yard and 2 fluid ounces of Plastiment per sack of cement.

Plastiment features are detailed in Bulletin PCD-59. Ask for your copy. District offices and dealers in principal cities; affiliate manufacturing companies around the world. In Canada, Sika Chemical of Canada, Ltd.; in Latin America, Sika Panama, S. A.

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INDEX TO ARTICLES

VOLUMES 1, 2, 3, 4 and 5
CONCRETE CONSTRUCTION MAGAZINE

A Listing of Basic Articles by Subject
Published from September 1956 through December 1960

Articles designated by arrows (▸) have been reprinted in a 120-page *Guide to Better Field Practice*, available at $2.00 per copy. Enclose remittance and send order to:

Concrete Construction Magazine
Box 444, Elmhurst, Illinois

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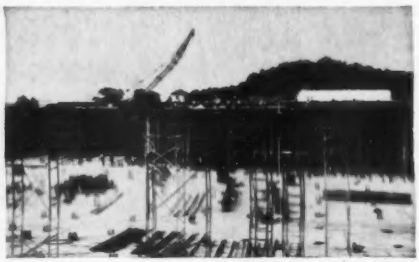

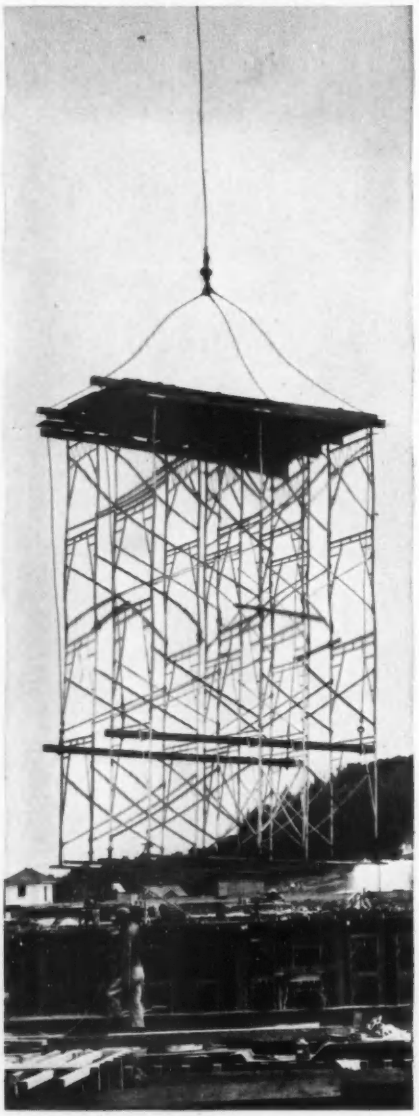

LIFTING of shoring from tank to tank is rapidly accomplished by crane.

Lifting, Rolling *Shoring Method* Saves Time

A MINIMUM number of "Trouble Saver"® Sectional Steel Shoring frames are used for this entire job—enough for about ¼ of the roof area of one of two 300′ dia. water tanks at Provin Mt. Reservoir, Feeding Hills, Mass.

By rolling, lifting, and again rolling only this amount of shoring from pour to pour in both tanks, joint venturers, Fruin-Colnon Contracting Co. and C&C Construction Co., are saving considerable time and equipment costs.

As pour areas are completed, 13′ x 15′ "Trouble Saver" Shoring sections with formwork in place are lowered on adjustable screw legs. PS Co. hydraulic shoring dollies are moved beneath these sections which are then rolled, as shown, to new pour areas in each tank.

Crane lifts shoring in 13′ x 15′ sections, with all formwork attached, from the completed first tank, swings around to the adjacent second tank, lowers the sections to the concrete floor. The dollies then roll the sections into position.

This project again illustrates the extreme versatility of "Trouble Saver" Sectional Steel Shoring. The easy-to-handle "prefab" end frames are rapidly assembled to form basic, free-standing units with practically any frame spacing required. Sectional units lock atop one another to form towers.

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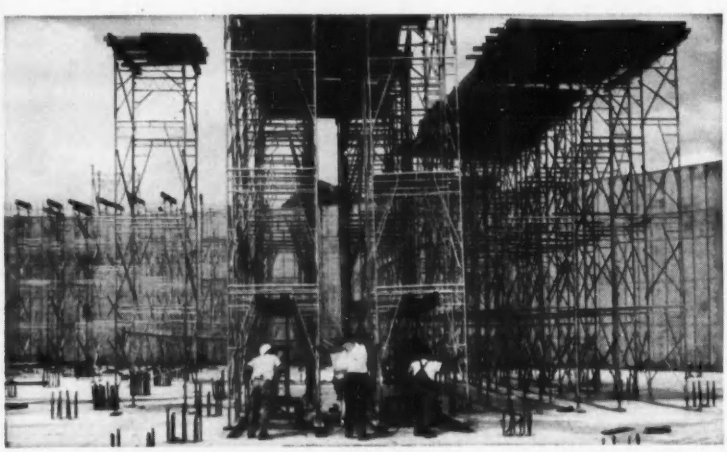

ROLLING is provided by PS Co. hydraulic shoring dollies.

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ALPHA

BETTER CONSTRUCTION THROUGH BETTER USE OF CEMENTS

news and notes from the field

The Right Way To Make a Slump Test

In many cases the acceptance or rejection of a load of concrete depends upon a one-inch variation in the slump. This much variation can be—and often is—caused by mistakes in making the slump test.

Sampling

If the slump test is to determine acceptability of the concrete, the sample must be taken from the early part of the load. Let out at least a wheelbarrowful before taking the sample. The first concrete out of the mixer should never be used for testing.

If the test is to be representative of the entire load, take samples from three parts of the load, directly from the mixer discharge. The total sample should be at least 80 lbs. and should be remixed in wheelbarrow before making slump.

1. Place Slump Cone on Plank, Slab or Steel Plate

Moisten the inside of the cone and place it on a flat, level, firm surface which extends several inches beyond the base of the cone. When putting concrete in the cone stand on the foot lugs to hold it firmly in place.

Reprints of the information on this page are available for the asking.

2. Fill Cone in 3 Layers

Fill the cone ⅓ full and rod layer exactly 25 times with a round, bullet-nosed iron or steel rod of ⅝" diameter. Rod uniformly over the entire concrete layer.

3. Use Bullet-Nose ⅝" Rod

Fill the cone with the second layer until ⅔ full and rod this layer 25 times uniformly over the entire concrete surface, penetrating into but not through the first or bottom layer.

4. Rod Each Layer 25 Times Uniformly

Fill the cone until it slightly overflows and then rod this top layer 25 times uniformly, penetrating into but not through the second layer.

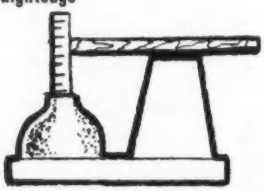
5. Strike Off Excess Concrete

Strike off excess concrete from the top with a straightedge so that the cone is exactly full. Remove spilled concrete from around the bottom of the cone.

6. Remove Cone Carefully

Lift cone straight up, slowly and gently, immediately after filling, rodding and strike-off are completed. Never jar the concrete at this point.

7. Measure Slump From Bottom of Straightedge



Measure the slump as shown above. If the top of the slump is irregular, do not measure the high point or the low point. Try to get the average. Caution: Never reuse this concrete for cylinder strength tests.

Recommended Slumps for Various Types of Construction*

Type of Construction	Slump inches**	
	Maximum	Minimum
Reinforced foundation walls and footings, and thin plain walls	5	2
Plain footings, caissons, and substructure walls	4	1
Slabs, beams, and reinforced walls	6	3
Building columns	6	3
Pavements	3	2
Heavy mass construction	3	1

*Adapted from Table 4 of the 1940 Joint Committee "Report on Recommended Practice and Standard Specifications for Concrete and Reinforced Concrete."

**When high-frequency vibrators are used, the values given should be reduced about one-third.

ALPHA

PORTLAND CEMENT COMPANY

Alpha Building, Easton, Pa.

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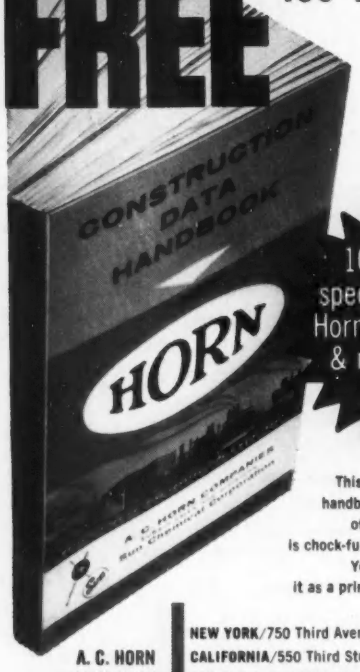

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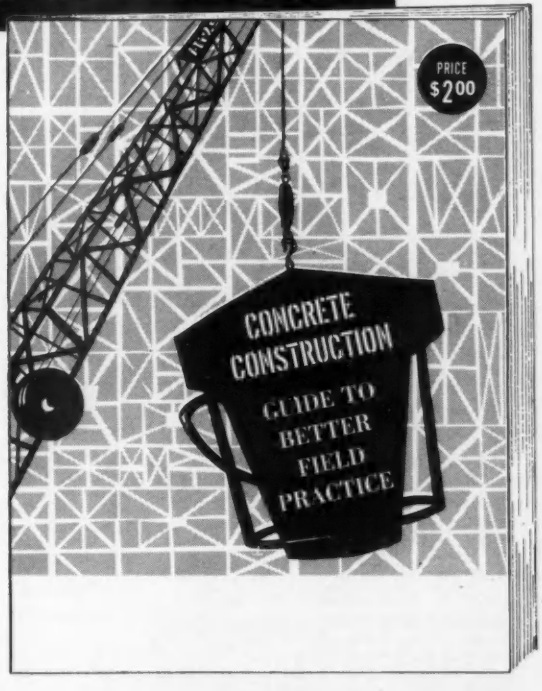

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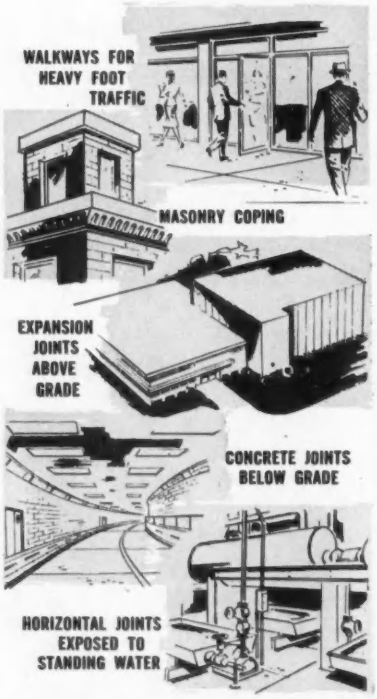
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news

NRMCA reports on 1959 ready mix production

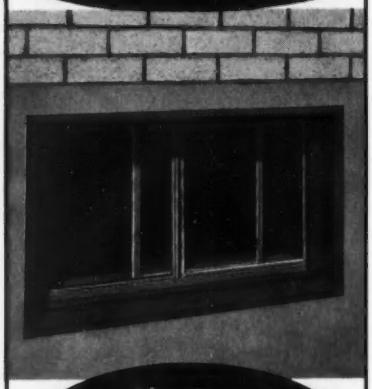
The National Ready Mixed Concrete Association has completed its ninth annual survey of the production and value of ready mixed concrete. Questionnaires were sent to 3,647 ready mixed concrete companies in the United States and Canada. Returns were received from 1,589 companies. In addition to the returns received from 1,589 companies, production data were also available on 198 member companies which did not return the questionnaire. These data have been incorporated in the study wherever possible, making a total participation of 1,787 companies, or 49 percent of the companies surveyed.

The participating companies reported a total production in 1959 of 95,731,365 cubic yards, valued at $1,309,118,567, at an average value of $13.67 per cubic yard. While there was an increase in production in 1959 as compared with 1958, the average value per cubic yard declined from $13.71 in 1958 to $13.67 in 1959.

Through a survey of cement manufacturers by the U. S. Bureau of Mines it was learned that cement manufacturers reporting to them shipped 52 percent, or 174 million barrels of their total production of portland cement in 1959 to ready mixed concrete producers. This information was supplied by cement manufacturers who produced 85 percent of the total cement output in the United States. The average cement consumption per cubic yard of concrete is assumed to be 1.33 barrels. Therefore the total production of ready mixed concrete in the United States in 1959 was approximately 130,500,000 cubic

Gates

SLIDING BASEMENT WINDOWS



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yards. The participating companies in the survey consumed 127,000,000 barrels of cement. Thus it follows that these companies were responsible for approximately 75 percent of the total ready mixed concrete production in 1959.

In the companies which reported to the Association, the average production per company and the median production increased substantially in 1959 when compared with 1958. Average production per company in 1959 was 53,571 cubic yards, an increase of 8,206 cubic yards from the 1958 average of 45,365 cubic yards, or 18 percent. Similarly, median production increased to 24,831 cubic yards in 1959 from 23,427 cubic yards in 1958.

Based on the reported production of 95,731,365 cubic yards of concrete, it is estimated that the reporting ready mixed concrete producers used approximately 127 million barrels of portland cement and 154 million tons of sand and coarse aggregate. This estimate is based on the assumption of an average sand and coarse aggregate consumption of 1.6 tons per cubic yard of concrete and the average cement consumption of 1.33 barrels per cubic yard of concrete.

The survey includes data on the production of lightweight concrete. The reporting companies produced in 1959 a total of 1,504,032 cubic yards of lightweight concrete.

Home building continues to be the largest market for ready mixed concrete, accounting for 35 percent of the total production. The 35 percent consumed by the home building market represents an increase in the percentage consumption by this largest consumer of 2 percent over the 33 percent of total production reported in the 1958 survey and 6 percent over the 29 percent reported in the 1957 survey.

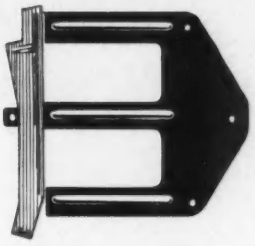
The other consumption cate-

Save Time... Save Money...

with BURKE CONCRETE ACCESSORIES, INC.

SAFETY IN STRENGTH

WORLD'S LARGEST STOCK OF VARIED ITEMS FOR CONCRETE CONSTRUCTION



VINES WALER BRACKET

The MODERN method of supporting walers on wood forms designed and engineered to give maximum performance and safety.

Vines Waler Brackets successfully support, space and retain walers independently of wall ties or clamps without toe nailing to studs and meet the requirements of the contractors and the safety engineer.

BURKE HANDY REEL

- Solid continuous aluminum frame.
- Self locking pin.
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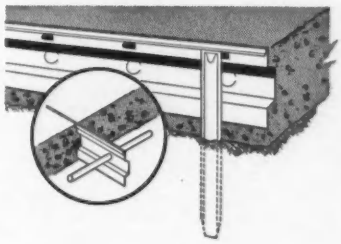
Finger tight screw means:

No wrenches to use . . . no parts to lose . . . no threads to strip. Easy to rewind.



KEYED KOLD JOINT FORMS

A new concrete construction product that serves as form, screed, and true cold joint, left permanently in the concrete floor slab. The use of Keyed Kold Joint eliminates spalled joints . . . produces a cold joint structurally sound and architecturally beautiful. Keyed Kold Joint also eliminates costly make-up and stripping of split forms for checkerboarding. Saves up to 35% in cold joint form costs . . . results in neater, uniform joints.

TO ORDER ANY OF THE ABOVE ITEMS OR FOR FREE BROCHURES & SPECIFICATION SHEETS USE COUPON BELOW.

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☐ 1. Vines Waler Bracket
☐ 2. Burke Handy Reel
☐ 3. Keyed Kold Joint Forms

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Sproule -osophies

Bore: A person who talks when you wish him to listen.

Ambrose Bierce

MY NAME is Bob Sproule. My business is calcium chloride. I have never set foot in Spokane. But I was once overcome by a bore in a barbershop in Seattle. Building contractor. We'd met once before. Here's the story in his own words . . . and I suggest that you skip the whole thing. Wish I could have.

"Say, I know you," he said to me. "You run a hardware business in Spokane. Right? Right! I never forget a face, Charley old boy. Never! How's business? Good? Got problems myself. Big problems. Running way behind schedule on this job outside town. Joker who's running the show expects me to set concrete with the temperature at twenty. Keep telling him it can't be done . . . but the guy won't listen. What do you do with a guy who won't listen? Answer me that! By golly, I guess we're holding up a couple of barbers with our talk. Better get into those chairs. See you around, Charley. Next time I hit Spokane, I'll stop by your place for sure."

Now, with calcium chloride in your mix . . . you *can* set concrete at 20° F. . . . and below. Why didn't I set the man straight? Couldn't! He didn't stop for breath, even. Had the lungs of a pearl diver. But I did mail him a copy of *Better Concrete in Every Season with Wyandotte Calcium Chloride*. Marked the section on cold-weather concreting in red. Maybe you'd like a copy. If so, just write: *Wyandotte Chemicals Corp., Dept. FS, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION
HEADQUARTERS FOR CALCIUM CHLORIDE

news

gories retained the same ranking as in 1956, 1957 and 1958, with commercial construction in second place, industrial construction in third place, highway construction in fourth place, non-Federal public works in fifth place, Federal public works in sixth place, and farm construction in seventh place.

The questionnaire also developed information on the extent to which ready mixed concrete producers are engaged in closely related industries. Of the 1,589 companies, 370 companies reported that they also produced concrete masonry products in addition to ready mixed concrete; 166 companies are engaged in precast concrete operations; 134 companies are engaged in the production of concrete pipe; 56 companies reported prestressed concrete operations.

prestressed concrete in Air Force runway

The Directorate of Civil Engineering of the United States Air Force Headquarters in Washington has announced a plan to permit use of a prestressed concrete inlay for the reconstruction of the primary runway and taxiway in Fairchild Air Force Base, Washington. This will be the first time in the United States that a prestressed concrete pavement project of such magnitude will be bid competitively with conventional concrete pavement. The pavement scope for Fairchild AFB will be approximately 79,000 square yards for the runway and 53,100 square yards for the taxiways. Construction at Fairchild AFB is tentatively scheduled to begin in the spring of 1961.

PANELS GO UP FASTER!

They're smoother too!

THOMPSON'S WATER SEAL

The proven bond-breaker for tilt-up, lift-slab or pre-cast concrete jobs. You get smoother, stain-free concrete. Saves crane time too.

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SYMONS Steel Stake

Pullout hole for easy removal
Easily secured to lumber—can be nailed every 1" O.C.
"I" beam design drives easier, holds best
Hi-Carbon Alloy Steel tough to bend
Rugged point with minimum deflection

Can Be Reused Indefinitely

Drives easily into hard earth. Can be used for practically any type of stake work. This popular item is available in 12", 18", 24", 30", 36" and 42" sizes.

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4271 Diversey Ave., Chicago 39, Ill., Dept.
We will send contractors a sample 12", 18" or 24" stake if request is received on company letterhead. Please include 50c for 12", 75c for 18", $1.00 for 24" to cover cost of postage and mailing.

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Lois J. Acker

women in construction

Delegates to the Fifth National Convention of Women in Construction unanimously acclaimed *Mrs. Lois J. Acker*, administrative assistant and a staff member of the firm of George L. Dahl Architects & Engineers of Dallas, Texas, as their national president for the year 1960-61. The convention was held at the Herring Hotel in Amarillo, Texas, last fall and was attended by nearly 400 women.

The new slate of national officers also includes: *Mrs. Mary DeCamp* of Windrom, Haglund & Venable, Architects, Memphis, Tenn., first vice president; *Mrs. Dorothy Vanderhyde* of Paderewski, Mitchell, Dean & Associates, Architects, San Diego, Calif., second vice president; *Mrs. Margaret Tuttle* of Lippert Brothers, Oklahoma, City, Okla., third vice president; *Mrs. Daria Curry* of Safeway Scaffolds Co., Houston, Texas, secretary; and *Miss Delores Hinton* of Pittsburgh Plate Glass Co., Shreveport, La., treasurer.

The National Association of Women in Construction is composed of 1,746 women who are employed in or who own businesses in the construction industry in the United States. Objects of the organization are: (1) to unite for their mutual benefit women who are actively engaged in the various phases of the construction industry; (2) to encourage cooperation and better understanding among women in the industry; (3) to promote fellowship and good will among members of the organization.

Thor

Everything you want in Finishing Screeds...*and more!*

Versatile Thor Screeds let you strike-off, compact, finish concrete slabs in one low cost operation. Lightest weight screed on the market . . . two men can handle, easily. Exclusive "StraPaction" vibration produces direct vibration along the entire length of the screed to the slab. Produces high-quality, hard surfaced slab. Cuts production time and costs on floors, runways, driveways, sidewalks, bridge decks, roof decks, tilt-ups, precast slabs, highways, and streets. Use inexpensive forms or pipe rails. Choose from 4′ to 30′ models. See them in action at your Thor distributor. Thor Power Tool Co., Aurora, Ill. Branches in all principal cities.

Want more information . . .

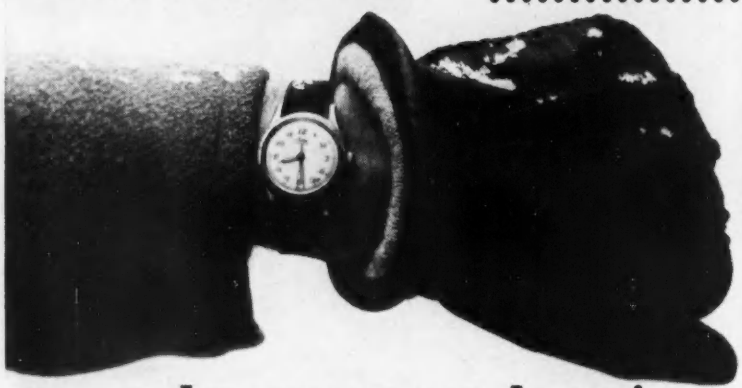
on the products advertised in this issue?

Write or phone . . .

the manufacturers listed in the adjacent column!

When you call or write for information, refer to the December issue of Concrete Construction.

Keep on schedule all winter



—order your ready-mix

SPECIAL WINTERIZED

with SOLVAY CALCIUM CHLORIDE

Ask your ready-mix supplier to include 2% of Solvay® Calcium Chloride,* with heated water and aggregate, in your ready-mix. Keep close to schedule at *any* temperature with this "Special-Winterized" mix that . . .

Reduces overtime finishing. Sets faster. **Speeds form removal.** Develops high early strength. **Reduces protection time** up to 50%. **Reduces delay** between operations. **Adds safety** through extra cold weather protection.

In addition, your concrete has 8 to 12% greater ultimate strength. And it's more workable. You use *less* water-to-cement, so you get denser concrete—more resistant to moisture and wear.

*Speeds but does not change the basic action of portland cement. This use of calcium chloride is approved by Portland Cement Association, American Concrete Institute, Calcium Chloride Institute, leading highway departments.

Write for *Solvay's 38-p. "The Effects of Calcium Chloride on Portland Cement."*

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